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PICTORIAL INTEREST INVENTORY DEVELOPMENT

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Concern has arisen as to the value of written inventories in assessing interests of individuals who possess comparatively low mental ability and/or reading skills. As a solution, nonverbal or picture inventories of interests have been developed. This study was initiated to develop a nonverbal interest inventory for use with aptitudinal information in the selection and classification of Air Force enlisted accessions.

A pictorial, nonverbal interest inventory was developed, consisting of 180 35mm color slides which cover a representative sample of Air Force jobs. During basic military training, 8,567 male and 3,296 female enlistees were administered the Pictorial Interest Inventory (PII) and Vocational Interest-Career Examination (VOICE). Eleven vocational interest scales factored for both male and female enlistees, with an additional factor (Shop Skills)

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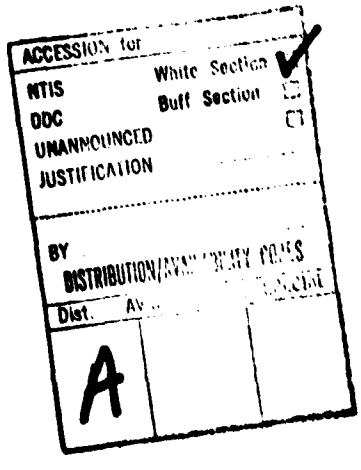
factoring for males. Other vocational scales found were Electronics, Office/Administration, Medical/Dental, Aircraft/Weapons Maintenance, Pararescue, Law Enforcement, Food Service, Heavy Duty Equipment Operator, Cable/Power Line Maintenance, Air Traffic Control, and Automobile/Aircraft Mechanic. Preferences for certain occupational scales were shown between sexes.

It was concluded that: (a) the PII can effectively identify vocational preferences of prospective enlistees in 11 areas; (b) photographs represent a viable alternative to the more traditional verbal methods in measuring interests, especially when verbal or reading abilities are in doubt; (c) individual responses to slide stimuli are interrelated in much the same manner as verbal items (VOICE); and (d) a validation of the PII with reference to job satisfaction should be performed to develop composites for counseling and assignment of prospective enlistees.

PREFACE

This research was conducted under project 7719, Personnel Selection and Retention for Optimal Productivity; task 771909, Development and Validation of Specialized Procedures to Improve Personnel Classification and Assignment. The authors would like to express their appreciation to Mr. Charles Greenway of the Computational Sciences Division (AFHRL) for the excellent statistical and programming support provided during the course of the study.



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I. INTRODUCTION

Current Air Force selection and classification procedures use aptitude test scores as the primary factor for placement of recruits in various jobs identified by Air Force Specialty Code (AFSC) numbers. An enlistee may enter a specialty in two ways: a guaranteed job prior to enlistment or selection of a career area during basic military training. The guaranteed enlistment, in some instances, is dependent on the enlistee's prior experience and the availability of such a job in the Air Force at the time of enlistment. In other instances, a guaranteed job is offered to a prospective enlistee who makes his selection based on written descriptions and photographs of available jobs. Those individuals who enter the Air Force without a guaranteed AFSC receive career guidance counseling during their basic military training program. At that time, a list of jobs available in the Air Force is presented to the enlistee. Having enlisted in a specific career area (Mechanical, Administrative, General, or Electronics), the enlistee then makes a job decision based on current availabilities in his career enlistment area. In many cases job selection is made with little knowledge of actual job content, which may lead to dissatisfaction in the selected career specialty. Even when job descriptions of specific AFSCs are available, the technical wording of the descriptions may render them useless for enlistees with limited reading skills.

Prospective employees are often assisted in job decisions through administration of a vocational interest inventory prior to job assessment. For some time such inventories have been a tool that industry has effectively utilized for job placement of prospective employees. Interest inventories provide information as to what a person's vocational interest may be and the general direction he should seek for employment and are also a potential measure of future satisfaction with his job (Strong, 1964). The interest test reduces the necessity of the individual's knowing specific tasks involved in various occupations, catalogs the applicant's interests, and estimates the relative value of these interests. Inventory results should maximize the likelihood of placing an individual in a job where his interests lie and minimize the chance of placing an individval in a job that is incompatible with his basic interests.

Paper-and-pencil interest inventories used in the civilian community include the Strong Vocational Interest Blank, Kuder Preference Test, and Occupational Interest Inventory (see Buros, *Seventh Mental Measurements Yearbook*, 1975). On vocational interest inventories such as these, an applicant indicates his preference (like, indifferent, or dislike) for a variety of activities or job titles. Written statements of job activities, skills, or events as contained in these inventories require a certain amount of reading comprehension and verbal ability on the part of the individual completing the inventory. This has caused concern as to the value of written inventories in the assessment of interests of those individuals who possess comparatively low mental ability and/or insufficient reading skills. As solutions to this problem, various interest inventories which are nonverbal in nature have been developed. One of the more popular nonverbal inventories is the Geist Picture Interest Inventory consisting of 132 drawings of job activities presented in 44 triads (Geist, 1959). Using a forced-choice format, the Geist yields 12 interest scores and seven motivational scores in measuring the interests of individuals in grades 8 through 16. Another nonverbal version is the Picture Interest Inventory (Weingarten, 1954), which uses line drawings to derive nine interest scores such as scientific, verbal, business, and mechanical. The most comprehensive nonverbal interest measure is the Wide Range Interest-Opinion Test (WRIOT) developed by Jastak and Jastak in 1970. The WRIOT is comprised of pictures which are presented in 150 triads. The activities are representative of those listed in the Dictionary of Occupational Titles and include a wide range of occupations from unskilled labor to professional and managerial positions. Jastak and Jastak state that the pictorial presentation has an advantage over the usual verbal measures when used with certain individuals who

may tend to misconstrue the meaning of printed statements such as those with limited schooling, inferior reading ability, or cultural disadvantage.

In general, high reliabilities have been found for the nonverbal interest measures. However, reviews indicate that little, if any, validity has been established. The consensus of the test reviewers was that nonverbal measures show much promise as a research tool and future use of such tests may be warranted, especially with individuals with limited reading ability (Buros, 1975).

As part of a major research effort to improve job placement techniques, the present study was initiated to develop and validate a nonverbal interest inventory for use with aptitudinal information in the classification and assignment of Air Force enlisted accessions.

The primary objectives of the study were: (a) to determine the feasibility of developing a nonverbal interest inventory; (b) to compare the nonverbal measure with the Vocational Interest-Career Examination (VOICE), a verbal interest inventory of 400 items designed for Air Force use (see Alley, Berberich, & Wilbourn, 1977; Alley, Wilbourn, & Berberich, 1976); and (c) to assess the utility of the nonverbal measure in predicting job satisfaction.

This report describes the overall development of the nonverbal interest inventory, specific scale development, and comparative data between nonverbal and VOICE interest scales.

II. DEVELOPMENT OF THE INSTRUMENT

A total of 300 35mm slides depicting Air Force jobs was obtained from the files of the 1361st Photographic Squadron in Arlington, Virginia. These slides were reviewed for inclusion in the experimental version of the Pictorial Interest Inventory (PII). The selection of slides was made using three main criteria: (a) The slide must be representative of a current Air Force specialty; (b) The action portrayed in the slide should clearly depict the task being performed; and (c) The slides should adequately cover a representative sample of career specialties in the four aptitude areas (Mechanical, Administrative, General, Electronics) in which lower ability personnel are most likely qualified. After a comprehensive review, 180 slides met the criteria for selection and were compiled into the initial version of the inventory. Career specialties depicted included a variety of jobs such as radar technician, pipefitter, typist, medical specialist, and mechanic. Special attention was directed toward ensuring that the slides realistically depicted the tasks being performed. Uniforms worn by the personnel in the slides represented actual dress required while on duty; personnel accomplishing the tasks in the slides included both minority and female representation. Inclement weather and poor working conditions were also shown.

III. DATA COLLECTION PROCEDURES

The PII and VOICE were administered in a counterbalanced design to 8,567 male and 3,296 female airmen during basic military training. One-half of the sample population completed the VOICE inventory first, followed by presentation of the PII. The remaining group was administered the PII first, then the VOICE. The 180 slides of the PII were projected on a screen one at a time, allowing about 15 seconds for the examinees to indicate their preference for the activity being shown in the slide. Examinees coded item responses to both the PII and VOICE in a standard L-I-D (Like-Indifferent-Dislike) format. Total testing time was approximately 1 1/2 hours: 45 minutes for the VOICE, 45 minutes for the PII.

IV. PII SCALE DEVELOPMENT

Principal axis factor analyses of the 180 PII items, with Varimax rotations (Kaiser, 1958), were accomplished for males and females separately, as well as for the total sample. For these analyses, item responses were coded as follows: 3 = like; 2 = indifferent; 1 = dislike. Extraction limits were set to provide 16, 21, and 26 Varimax factors.

Results of the factor analyses were similar for male and female subgroups as shown in Table 1. Due to this similarity, males and females were combined for the scale development. In the extraction process, 12 orthogonal factors were identified for males and 11 for females. The Shop Skills factor did not appear for females. The

Table 1. **Representative Item Content of the PII**

Scale	Pictorial Slide	Factor Loading	
		Male	Female
Electronics	Working on electrical controls	.83	.76
	Adjusting an oscilliscope	.79	.81
Office/Administration	Office worker	.81	.82
	Typist	.80	.83
Medical/Dental	Giving a tuberculin test	.83	.86
	Adjusting artificial kidney machine	.82	.86
	Making false teeth	.47	.46
Shop Skills	Using drill press	.82	
	Using a metal lathe	.78	
Aircraft/Weapons Maintenance	Attaching wing section to jet	.66	.56
	Preparing missiles for loading	.59	.52
Pararescue	Rescuing downed pilot in woods	.56	.33
	Rescuing injured soldier by helicopter	.59	.71
Law Enforcement	Law enforcement spl gate entry	.80	.88
	Guarding helicopter with dog	.75	.41
Food Service	Cooking barbecued ribs	.86	.88
	Baker decorating pies	.78	.80
Heavy Duty Equipment Operator	Driving a bulldozer and grader	.48	.52
	Forklift operator	.78	.74
Cable/Power Line Maintenance	Stretching telephone cable	.74	.62
	Working on electrical pole	.70	.56
Air Traffic Control	Controller talking to helicopter	.62	.50
	Flight controller using scope and mike	.64	.81
Automobile/Aircraft Mechanic	Repairing jeep motor	.62	.77
	Repairing jet engine	.31	.82

factors represented about 50% of the variance in the total sample. The first four factors were identifiable in both the 16- and 21-factor solutions with the remaining dimensions most evident in the 26-factor solution. Representative slides for each scale are also shown in Table 1.

The first factor (Electronics) had 124 individual slides in the PII with loadings of .30 or greater. On the other hand, the smallest factor (Food Service) had only seven slides above this minimum value.

Using the factor loadings for each of the 180 slides, an individual's factor scores could be computed. However, from an operational standpoint, this procedure is too complex and cumbersome without the use of sophisticated computer hardware. To remedy this problem, an effort was made to construct integer weighted subscales corresponding to each of the 12/11 dimensions identified in the analysis. Factor loadings for slides within each scale were rank ordered from highest to lowest. Slides were then selected to represent a specific job dimension beginning with those with the highest loadings and continuing until one of two criteria were met: (a) A maximum of 20 slides were selected, or (b) Item loadings fell below a minimum value of .30. The empirical basis for this procedure has been documented in a previous research application (Alley et al., 1977).

As shown in Table 2, the number of slides meeting the criteria for the 12/11 scales ranged from 7 to 20 per subscale. Item characteristics for

Table 2. Scale Statistics for the PII

PII Scales	No. Items	Score Range[a]	Male		Female		Alpha Coefficients[b]	
			$\bar{X}$	SD	$\bar{X}$	SD	Male	Female
Electronics	20	20–60	39.85	11.35	36.82	10.99	.95	.95
Office/Administration	20	20–60	32.21	10.38	41.35	11.33	.94	.94
Medical/Dental	20	20–60	31.72	10.81	38.79	11.72	.95	.95
Shop Skills[c]	20	20–60	36.38	11.32	–	–	.95	–
Aircraft/Weapons Maintenance	20	20–60	39.57	11.05	32.40	10.79	.95	.95
Pararescue	17	17–51	34.11	8.75	31.30	9.09	.91	.91
Law Enforcement	10	10–30	19.41	6.23	17.97	5.67	.91	.88
Food Service	7	7–21	9.12	3.05	11.21	4.12	.86	.89
Heavy Duty Equipment Operator	8	8–24	15.02	4.94	12.11	4.38	.91	.90
Cable/Power Line Maintenance	8	8–24	13.93	4.18	11.65	3.93	.85	.86
Air Traffic Control	11	11–33	25.12	5.91	24.53	6.29	.90	.91
Automobile/Aircraft Mechanic	11	11–33	21.18	7.12	16.27	6.27	.94	.94

[a]Individual items are scored: 3 = Like; 2 = Indifferent; 1 = Dislike. Missing or otherwise invalide response are re-coded to a value of 2.

[b]Kuder-Richardson 20 (Bronback, 1951), Uncorrected.

[c]Did not factor for females.

all male and female scales can be seen in Table A1 in the appendix.

V. SCALE CHARACTERISTICS

Summary statistics for each PII scale are presented in Table 2 which catalogs the number of items, score range, raw score means, and standard deviations by sex group. Also shown in Table 2 are the internal consistencies of the scales. These estimates range from a low of .85 to a high of .95 across the male and female subgroups. The 20-item scales had higher internal reliability values (.94 to .95) than did the shorter scales, which ranged from .85 to .94.

A comparison between male and female performance on the 11 common scales indicates that, on the average, males typically scored higher than females on Electronics, Aircraft/Weapons Maintenance, Pararescue, Law Enforcement, Heavy Duty Equipment Operator, Cable/Power Line Maintenance, and Automobile/Aircraft Mechanic. Preferences among females, as a group, were higher for Office/Administration, Medical/Dental, and Food Service. A negligible difference between males and females was noted on the Air Traffic Control scale.

VI. RELATIONSHIP OF PII SCALES TO VOICE SCALES

Since the VOICE has been validated for job satisfaction and favorably considered for operational use in the classification and assignment of enlisted personnel, it was necessary to determine the relationships between the PII specifically designed for use with individuals with limited schooling and/or reading ability and the more traditional inventory, the VOICE. The relationships between scales of the two inventories were assessed by the correlations between individual subscales and by multiple correlational analyses where all PII scales were used to replicate the VOICE subscales.

Correlations between the subscales indicated that several of the PII scales have more or less direct analogues among subscales of the VOICE. The relationships are presented in Table 3. The VOICE contains 400 items which yield 18 subscales. The 180 slides of the PII are grouped into 11/12 scales. Correlations above .80 were noted between individual subscales of the two inventories for Medical Service, Mechanics, and Food Service. Substantial correlations (.65 to .70) were also found between the two inventories for the Office Administration, Electronics, Heavy

Table 3. **Correlations Between VOICE Subscales and PII Scales for Male and Female Enlistees**

VOICE Subscale	Electronics	Office/Adm	Medical/ Dental	Shop Skills	Acft/Wpns Maintenance	Para-Rescue	Law Enforcement	Food Service	Hvy Duty Eqp Operator	Cable/ Power Line	Air Traffic Control	Auto/Acft Mechanic	All PII Scales (R)
Office Administration	.07	.79	.49	−.24	−.25	−.12	−.05	.47	−.13	−.18	.15	−.29	.80
Electronics	.69	−.28	−.17	.67	.61	.31	.18	−.21	.42	.50	.38	.64	.83
Heavy Construction	.27	−.36	−.21	.78	.67	.50	.41	−.08	.77	.79	.10	.73	.87
Science	.48	.18	.44	.09	.16	.26	.08	.03	−.01	.08	.45	.06	.66
Outdoors	.23	−.15	.01	.31	.36	.52	.37	.06	.32	.39	.23	.31	.54
Medical Service	.02	.55	.88	−.28	−.24	.08	.03	.41	−.21	−.16	.14	−.31	.89
Aesthetics	.08	.54	.52	−.28	−.24	.01	−.05	.37	−.26	−.19	.17	−.31	.62
Mechanics	.34	−.45	−.31	.82	.71	.39	.32	−.23	.63	.60	.14	.86	.87
Food Service	−.07	.52	.47	−.21	−.21	−.01	.01	.81	−.10	−.11	.01	−.24	.83
Law Enforcement	.18	−.09	.09	.31	.41	.67	.73	.01	.42	.45	.25	.30	.76
Audiographics	.38	.29	.32	.10	.17	.34	.19	.18	.12	.16	.42	.06	.58
Mathematics	.39	.37	.27	.02	.02	.03	−.04	.14	−.05	−.01	.34	−.02	.53
Agriculture	.11	.15	.34	.14	.16	.43	.33	.31	.24	.32	.14	.11	.61
Teacher/Counseling	.16	.54	.54	−.17	−.13	.13	.10	.33	−.12	−.08	.26	−.21	.63
Marksman	.28	−.42	−.25	.58	.60	.55	.54	−.26	.53	.53	.19	.57	.74
Craftsman	.18	.51	.48	.03	−.01	.09	.07	.52	.04	.06	.17	−.05	.67
Drafting	.43	.20	.20	.21	.21	.26	.10	.06	.13	.19	.39	.15	.52
Automated Data Proc.	.49	.56	.32	−.02	.00	−.03	−.06	.15	−.07	−.06	.45	−.07	.73

Construction, and Law Enforcement subscales, and high correlations were found between the PII-Shop Skills and VOICE-Electronics, -Heavy Construction, and -Mechanics scales. The PII-Cable/Power Line Maintenance scale was also highly correlated with the VOICE-Heavy Construction subscale. The fact that the VOICE-Heavy Construction subscale correlated highly (.65+) with five PII scales indicates that slides selected for the PII tend to measure career areas normally filled with low ability airmen. This is also substantiated by the lower correlations found between the PII and some of the VOICE subscales (e.g., Drafting, Aesthetics, Automated Data Processing) which are filled with higher ability enlistees.

The results of the multiple correlational analyses indicate that the combination of all PII scales can replicate the VOICE subscales with varying degrees of accuracy. It appears that the VOICE subscales of Office Administration, Electronics, Heavy Construction, Medical Service, Mechanics, and Food Service are those scales most accurately duplicated by the PII scales. About 50% of the total variance associated with the VOICE subscales can be accounted for by the PII linear combinations. For these specific areas, it would appear that the PII might be as effective a tool as the VOICE for identifying an individual's interests. Further research is required to determine the specific relationships between PII, VOICE, and aptitudinal information in predicting future job satisfaction or some measure of job performance.

VII. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A pictorial interest inventory was developed, comprised of 180 photographs covering a representative sample of career specialties in the four aptitude areas. As a result of factor analyses, 11 interest scales which were essentially the same for both male and female subgroups were identified. Males also factored on a Shop Skills scale. The amount of original item variance accounted for by the 12/11 factors represented about 50% in the total sample. Internal consistency values of items within the homogeneous scales ranged from .85 to .95. Normative data based on the 8,567 male and 3,296 female enlistees indicated that while the scales may have similar meaning for both sexes, the degree of preference associated with each scale was not always similar for both groups. Males typically indicated a stronger preference for Electronics, Aircraft/Weapons Maintenance, Pararescue, Law Enforcement, Heavy Duty Equipment Operator, Cable/Power Line Maintenance, and Auto/Aircraft Mechanic. Females preferred Office/Administration, Medical/Dental and Food Service.

Based on the results of this study, it is concluded that:

1. The Pictorial Interest Inventory can effectively identify the vocational preferences of prospective enlistees.

2. Photographs represent a viable alternative to the more traditional verbal methods for eliciting a realistic basis for vocational decisions of enlistees with little or no actual knowledge or experience with Air Force career fields.

3. Individual responses to the slide stimuli are interrelated in much the same manner as verbal items (VOICE).

4. Eleven dimensions were identified as similar for males and females.

5. Overall, it was concluded that pictorial administration of a vocational interest inventory could be used to elicit such information when verbal or reading abilities are in doubt.

It is recommended that further research be accomplished to validate the scales of the PII with reference to job satisfaction in the Air Force and to develop operational composites for counseling and assignment of enlisted accessions.

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APPENDIX A. SUPPORTING TECHNICAL MATERIAL

Table A1. **PII Item Characteristics for Male and Female Air Force Enlistees**

Item No.	Item	Male			Female		
		$\bar{X}$	SD	Factor Loading	$\bar{X}$	SD	Factor Loading
	Electronics						
2	repairing a telephone circuit	1.96	.78	.55	1.84	.78	.35
7	tuning a radio	2.32	.74	.56	2.37	.71	.60
37	repairing a radar module	2.04	.79	.60	1.73	.79	.43
42	testing an electrical circuit	2.09	.83	.77	1.82	.82	.48
43	calibrating electrical apparatus	2.05	.78	.79	1.95	.87	.67
49	using a radar scope	2.21	.78	.56	2.14	.81	.82
55	adjusting an altimeter	2.05	.79	.79	1.80	.77	.66
66	repairing a radar instrument	1.97	.78	.59	1.74	.77	.42
85	adjusting an oscilloscope	2.10	.80	.79	2.08	.81	.81
86	setting radio controls	2.09	.78	.64	2.10	.79	.78
92	calibrating an altimeter	1.62	.65	.51	1.50	.61	.35
93	air traffic controllers	2.07	.83	.58	2.07	.83	.82
100	sighting a radar scope	1.89	.75	.51	1.65	.73	.39
110	working on electrical controls	1.99	.82	.83	1.89	.81	.76
115	adjusting a generator	1.69	.72	.61	1.48	.64	.39
149	testing a scope using ammeter	2.01	.82	.75	1.91	.81	.81
158	testing aircraft control system	1.87	.82	.84	1.65	.76	.55
161	spot testing field elec. system	1.88	.83	.71	1.55	.75	.35
177	testing a power generator	1.77	.77	.71	1.48	.68	.37
180	viewing a radar scope (ATC)	2.17	.83	.62	2.07	.86	.84
	Office/Administration						
24	draftsman	1.83	.81	−.53	2.06	.78	−.36
27	typing a radio transmission	1.62	.77	−.66	2.03	.82	−.74
28	working on base paper	1.73	.79	−.69	2.25	.79	−.66
41	transportation specialist	1.79	.78	−.59	2.57	.67	−.49
48	office worker	1.44	.70	−.81	1.95	.87	−.82
50	teletype operator	1.50	.69	−.70	1.84	.80	−.74
54	education specialist	1.56	.74	−.63	1.93	.79	−.49
61	switchboard operator	1.46	.67	−.54	2.00	.83	−.61
63	working a computer scope	1.93	.83	−.61	2.26	.80	−.72
72	keypunch operator	1.39	.64	−.75	1.85	.82	−.83
82	file clerk	1.44	.68	−.77	2.02	.86	−.76
90	loading a card sort machine	1.78	.81	−.66	2.20	.79	−.74
94	payroll clerk	1.65	.76	−.50	2.05	.82	−.56
102	test administrator	1.73	.81	−.49	2.27	.80	−.29
107	typist	1.35	.64	−.80	1.87	.87	−.83
117	working copying machine	1.49	.72	−.79	2.05	.85	−.83
120	illustrator	1.63	.78	−.48	2.10	.84	−.25
124	working computer console	1.84	.85	−.62	2.08	.83	−.71
141	working card duplicator	1.65	.79	−.70	2.03	.83	−.76
145	filing X rays	1.40	.67	−.72	1.93	.86	−.72

Table A1 (*Continued*)

Item No.	Item	Male			Female		
		$\bar{X}$	SD	Factor Loading	$\bar{X}$	SD	Factor Loading
	Medical/Dental						
17	administering a blood test	1.55	.74	−.71	1.99	.87	−.78
33	medic working with newborn infant	1.65	.81	−.74	2.21	.88	−.80
44	using a microscope	1.78	.79	−.59	2.14	.83	−.62
47	fixing a dog's leg	1.86	.84	−.45	2.14	.86	−.41
67	performing a blood gas analysis	1.93	.83	−.47	1.93	.78	−.47
71	making an ID photograph	1.55	.70	−.51	1.98	.78	−.43
73	giving an injection	1.50	.73	−.73	1.75	.86	−.75
96	preparing lab cultures	1.55	.75	−.75	1.99	.86	−.74
105	using medical laboratory equipment	1.62	.73	−.53	1.72	.77	−.49
109	giving a tuberculin test	1.51	.76	−.83	1.84	.90	−.86
111	working inhalator	1.55	.74	−.81	1.95	.83	−.82
128	adjusting traction on broken arm	1.55	.77	−.79	2.15	.90	−.84
139	pharmacist	1.60	.79	−.71	1.97	.86	−.66
143	X-ray technician	1.67	.81	−.79	2.10	.86	−.77
148	adjusting artificial kidney machine	1.52	.75	−.82	1.86	.87	−.86
162	using microscope	1.63	.77	−.68	1.97	.83	−.65
166	giving hearing test	1.55	.71	−.48	1.87	.78	−.38
170	giving dental X rays	1.52	.75	−.72	1.96	.85	−.62
172	making false teeth	1.46	.67	−.47	1.50	.70	−.46
176	taking picture of mouth	1.41	.68	−.66	1.77	.82	−.58
	Shop Skills						
9	testing refrigerant	1.77	.70	.44	Did Not Factor		
11	repairing metal tubing	1.71	.72	.55	Did Not Factor		
16	testing a power generator	1.94	.78	.43	Did Not Factor		
22	using a metal lathe	1.90	.81	.78	Did Not Factor		
46	welding	1.93	.83	.72	Did Not Factor		
53	riveting sheet metal	1.73	.74	.68	Did Not Factor		
57	repairing a gas boiler	1.72	.74	.52	Did Not Factor		
62	adjusting a carburetor	1.96	.79	.57	Did Not Factor		
69	repairing jeep suspension system	1.90	.86	.50	Did Not Factor		
88	using screwdriver	1.92	.86	.54	Did Not Factor		
89	using drill press	1.78	.78	.82	Did Not Factor		
97	drilling metal gasket	1.72	.77	.83	Did Not Factor		
104	using tools	1.77	.74	.52	Did Not Factor		
118	using power table saw	1.89	.82	.65	Did Not Factor		
121	using pneumatic buffer	1.68	.76	.55	Did Not Factor		
137	using calipers	1.63	.73	.77	Did Not Factor		
142	working on diesel motor	1.91	.83	.54	Did Not Factor		
154	welding	1.77	.81	.77	Did Not Factor		
159	adjusting helicopter rotor	1.88	.50	.43	Did Not Factor		
160	working on automobile motor	1.88	.85	.54	Did Not Factor		

Table A1 (*Continued*)

Item No.	Item	Male			Female		
		$\bar{X}$	SD	Factor Loading	$\bar{X}$	SD	Factor Loading
	Food Service						
7	baker – decorating pies	1.44	.69	.78	1.84	.83	–.80
40	cook – cooking large vat of soup	1.23	.54	.83	1.40	.67	–.83
70	fabric repair	1.15	.42	.20	1.44	.70	–.41
84	placing salads on counter	1.26	.55	.84	1.57	.76	–.87
101	dieticians – hospital	1.29	.59	.81	1.72	.81	–.77
134	commissary stocker	1.48	.70	.34	1.76	.79	–.49
168	cooking barbecued ribs	1.26	.57	.86	1.47	.72	–.88
	Heavy Duty Equipment Operator						
38	packaging a large box	1.54	.67	–.38	1.54	.69	–.41
74	driving a bulldozer	2.16	.82	–.43	1.61	.80	–.40
78	driving a forklift	1.87	.78	–.74	1.57	.71	–.74
81	forklift operator	1.89	.79	–.78	1.55	.71	–.74
138	loading plane with forklift	1.92	.81	–.74	1.55	.74	–.64
150	using a wrecker	1.81	.81	–.44	1.37	.64	–.47
157	driving a bulldozer and grader	2.00	.85	–.48	1.48	.74	–.52
167	loading a plane with forklift	1.85	.80	–.73	1.45	.68	–.70
	Cable/Power Line Maintenance						
3	stretching telephone cable	1.83	.79	.74	1.49	.72	–.62
6	repairing a street	1.39	.62	.47	1.42	.66	–.41
74	driving a bulldozer	2.16	.82	.34	1.61	.80	–.37
76	testing a pipeline	1.69	.72	.38	1.40	.63	–.39
99	sewage treatment	1.45	.65	.28	1.39	.62	–.25
119	working on electrical pole	1.77	.80	.70	1.52	.73	–.56
136	repairing underground telephone cables	1.66	.74	.53	1.35	.60	–.44
157	driving a bulldozer	2.00	.85	.35	1.48	.74	–.36
	Air Traffic Control						
7	calibrating a radio receiver	2.32	.74	–.35	2.37	.72	–.62
8	flight engineer talking on mike	2.55	.67	–.43	2.36	.77	–.44
19	controller talking to helicopter	2.51	.70	–.62	2.59	.67	–.50
34	controller using scope	2.32	.77	–.65	2.26	.81	–.75
39	ground controller	2.26	.76	–.32	2.25	.82	–.29
49	flight controller using scope and mike	2.21	.78	–.64	2.14	.81	–.81
58	computer operator	2.04	.82	–.34	2.14	–.79	–.59
60	flight engineer	2.57	.71	–.38	2.19	.87	–.43
86	radio operator	2.09	.78	–.40	2.09	.79	–.78
93	flight controllers at scopes	2.07	.83	–.58	2.07	.83	–.81
	Automobile/Aircraft Mechanic						
4	fixing tire	1.68	.78	.48	1.49	.71	.51
62	adjusting carburetor	1.96	.79	.40	1.55	.74	.82
65	working on reciprocal engine	2.17	.84	.34	1.68	.83	.75
69	repairing jeep suspension	1.90	.86	.63	1.48	.75	.75
77	working on reciprocal engine	2.09	.86	.38	1.55	.78	.77
88	working on jeep motor	1.92	.86	.63	1.34	.65	.79

Table A1 (*Continued*)

Item No.	Item	Male			Female		
		$\bar{X}$	SD	Factor Loading	$\bar{X}$	SD	Factor Loading
125	repairing jet engine	1.97	.85	.31	1.51	.75	.82
142	working on diesel motor	1.91	.83	.55	1.45	.69	.84
150	using wrecker	1.81	.81	.29	1.37	.64	.53
159	working on helicopter	1.88	.80	.33	1.44	.66	.80
160	repairing jeep motor	1.88	.85	.62	1.44	.71	.77
	Law Enforcement						
29	law enforcement spl – gate entry	1.94	.85	.80	2.12	.84	–.88
52	forward ground observer – combat	1.92	.80	.44	1.74	.82	–.34
59	security policeman with dog – combat	2.17	.86	.72	2.04	.89	–.46
106	perimeter control – combat	1.89	.86	.53	1.52	.77	–.45
127	base gate guard	1.87	.87	.81	2.04	.88	–.88
131	M-16 instructor – SP	1.89	.82	.75	1.61	.77	–.56
135	guarding helicopter with dog	2.05	.88	.75	1.87	.89	–.41
146	weapons instruction – LE/SP	1.76	.80	.30	1.57	.75	–.34
152	SP guarding jet	1.98	.85	.67	1.85	.80	–.62
178	SP guarding jets	1.95	.85	.76	1.71	.78	–.37
	Aircraft/Weapons Maintenance						
1	attaching fuel tank to wing	2.12	.79	.56	1.72	.79	.54
13	placing drag chute in aircraft	2.18	.72	.64	1.97	.81	.40
14	attaching wing section to jet	2.29	.75	.66	1.92	.83	.56
15	working on aircraft control cables	2.15	.80	.53	1.69	.80	.62
23	jet mechanic	2.17	.79	.62	1.69	.80	.69
35	jet corrosion control	1.72	.75	.54	1.75	.78	.40
39	ground control of jet	2.26	.76	.72	2.25	.82	.27
64	loading air-to-air missile	1.86	.76	.49	1.44	.67	.60
65	repairing reciprocal engine	2.17	.84	.61	1.68	.83	.75
75	fueling jet-liquid oxygen	2.02	.79	.68	1.69	.78	.57
77	working on reciprocal engine	2.09	.86	.57	1.55	.78	.77
98	loading an ejection seat	1.98	.78	.63	1.52	.70	.76
113	arming a Gatling gun	1.86	.80	.40	1.39	.64	.47
122	attaching defoliation tank	1.80	.77	.59	1.41	.64	.64
123	cleaning jet landing gear	1.76	.78	.54	1.41	.65	.64
125	working on jet engine	1.97	.85	.49	1.51	.75	.82
126	preparing missiles for loading	1.91	.82	.59	1.44	.69	.52
132	fuel specialist	1.81	.80	.64	1.53	.74	.56
165	checking bombs	1.65	.76	.49	1.37	.61	.45
173	fuel specialist	1.78	.78	.60	1.47	.69	.61
	Pararescue						
21	parachute rigger	1.51	.67	.39	1.62	.72	–.39
25	field weather operators	2.05	.79	.31	1.96	.82	–.30
52	forward ground observer – combat	1.92	.80	.36	1.74	.82	–.36
56	seaman	1.96	.81	.30	2.00	.85	–.50
59	combat patrol	2.17	.86	.31	2.04	.89	–.30
60	flight engineer	2.57	.71	.32	2.19	.87	–.45

Table A1 (*Continued*)

Item No.	Item	Male			Female		
		$\bar{X}$	SD	Factor Loading	$\bar{X}$	SD	Factor Loading
87	seaman taking weather reading	1.82	.76	.30	1.75	.75	.42
95	rescuing downed pilot in woods	1.98	.86	.56	1.88	.89	.33
106	perimeter control combat	1.89	.86	.37	1.52	.77	−.35
113	loading Gatling gun	1.86	.80	.31	1.39	.64	−.31
116	parachute instructor	1.89	.80	.63	1.89	.84	−.73
130	rescuing injured soldier by helicopter	2.24	.84	.59	1.98	.89	.71
135	guarding helicopter with dog combat	2.05	.88	.32	1.87	.89	.36
144	combat photographer	2.18	.80	.31	2.18	.64	.47
164	pararescue Frogman	2.04	.89	.67	1.76	.87	.71
169	rescuing pilot from tree	1.91	.83	.55	1.67	.80	.48
171	placing man in space suit	2.07	.81	.37	1.87	.82	.52

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